II. Tire Manufacturing Machinery

A. Sino-Soviet Bloc Supply Position

By Western standards, most of the tire-building machinery installed in the Sino-Soviet Bloc tire plants is obsolete. For example, the best factory in the USSR - the major Bloc tire producer - is said to be the Moscow Tire Plant. This plant is basically the old Ford "River Rouge" plant which was sent to the USSR under "Lend-Lease" during World War II. The equipment for this plant was built in 1935-1936 and is now more than 20 years old. While additions and replacements have been made since, the plant remains obsolete, requires a disproportionate amount of mannual labor, and boasts of few modern innovations. The other ~~plants~~ tire plants in the Bloc are not believed to be any better equipped.

Tire-manufacturing machinery is produced in the USSR, East Germany, Czechoslovakia, and in Communist China. However, only the USSR, East Germany, and Czechoslovakia have any significant production, and the technological level of their output is generally below Western standards. As a result, the Sino-Soviet Bloc as a whole relies heavily on Western machinery to modernize its tire plants. The USSR, in 1957, signed a contract with the United Kingdom for the purchase of a modern tire plant with an annual capacity of 2 million tires at a cost expected to exceed 28 million dollars. Also, under the terms of the current Franco-Russian trade agree-

ment, France was to export 50 tire presses to the USSR in 1957 and another 50 before the end of 1959. On the other hand, the Bloc has also engaged in some exports of tire-manufacturing machinery . Indonesia ordered a tire plant from Czechoslovakia in 1956, and East Germany has offered to supply such machinery to Uruguay.

Judging from Russian orders for tire manufacturing equipment from the West and from complaints in the Soviet press about [redacted] domestically produced equipment, it appears evident that the Russians are not producing enough of the necessary types of machinery to satisfy their requirements, and the equipment which is being manufactured is technically obsolete.

T The USSR tire equipment production capability is substantially supplemented by two plants in Czechoslovakia and East Germany. Thus the Bloc could probably get along without purchases of Western equipment. However, the USSR is interested in buying the most up-to-date machinery - which thus far has been available only in the West - in order to augment its tire-making capacity ~~more quickly~~ and to increase the productivity of its existing plants.

B. [redacted] Tire-making Machinery Production and Production Problems

1. USSR

Data on Soviet production of tire-making machinery is sparse. The

USSR has published no statistics on the quantity of production and little information on the types of machinery being produced. Several plants are manufacturing tire-making equipment along with other types of machinery, the largest and most specialized plant being the Bolshevik Chemical Machinery Plant in Kiev. Judging by the information available, the product-mix and the quality of equipment is inadequate to meet the needs of the tire industry. Rubber mixers and calenders produced in 1956 were no different from those produced 20 years ago. The mixers are produced in only one type-size and with a single shaft-speed, although the modern rubber industry requires three type-sizes of mixers and the shafts of large mixers should have two speeds. Cord calenders have speeds less than half of those of the best Western types, with a primitive and inefficient system of regulating the thickness of the rubber layer. As a result, the variation of thickness is ten times as great as in modern calender designs. Only individual vulcanizers are produced for motor vehicle tires. Consequently, the tires must be molded prior to vulcanization and a large number of vulcanization molds must be used, whereas modern tire plants use automatic vulcanizer presses for this purpose.

A Soviet engineer, writing an article on the technology of tire production in the June 1957 edition of Mekhanizatsiya Trudoyemkikh i Tyzhelykh Rabot (Mechanization of Labor-Consuming and Heavy Work), stated that the USSR is increasing the mechanization of her tire plants, but that many basic and auxiliary processes have not as yet been mechanized. Thus loading and unloading, distribution, and storage operations should be fully mechanized since they require a large amount of manual labor. To meet this need, he stated, the USSR had designed a standard hopper storage for carbon black and had planned a system of worm conveyers for its distribution to the hoppers and for subsequent unloading. The introduction of such automatic equipment which would mechanize the process of mixing carbon black would, according to the writer, permit an annual saving in excess of 20 million rubles. He admitted, however, that mechanized storage facilities were being built so slowly that not one of them had been put into actual operation at the time of his writing.

The writer also described in great detail an installation for automatic weighing and feeding of raw materials into rubber mixers used in modern tire plants in Great Britain and in the United States, and added that "The construction of a similar automatic system in the USSR was delayed intolerably long and an experimental unit is only now being set up in the Voronezh Tire Plant."

Discussing machinery used for the vulvanization of tire casings, the writer stated that the most modern equipment available are tire presses. These come in two different designs, the "autoform" and "Bag-o-matic" types, which, he intimated, should be adopted by the Soviet tire-making industry. "In introducing tire presses, it is necessary to replace old vulcanization equipment (autoclaves) with new, but it is impossible to do this immediately in all USSR tire plants. Therefore, they are mechanizing the recharging of autoclaves and molds, but these operations are being carried out too slowly." An example is the long delay in the design work for magnetic presses which were to be developed by a rubber machinery design organization, the Yaroslavl tire plant and Rezinoproyekt. The use of such modernized presses will significantly increase the productivity of labor. Also, the general introduction of a system of complex mechanization of the finishing operations involved in the manufacture of tire casings, such as had been installed at the Moscow tire plant, is being intolerably delayed".

The article goes on to say that plants are not sufficiently mechanizing the assembly of tire casings and tubes, nor the tire storage and handling operations. Finally, it stressed the urgent need for installing electronic devices to control the production of plies for tire casings, for automating the manufacture of precision-cut casing parts and for controlling the pro-

cess of rubber-coating tire cord. Owing to a number of design defects, the article stated, it is impossible to manufacture material of consistently accurate sizes on ~~existing~~ available calenders, ~~but it added that~~ Recent modern technology makes it possible to increase significantly the accuracy of calender operations. However, the several Soviet research institutes responsible for developing calenders and cutting machines are lagging badly behind in solving the problems of installing the necessary electronic control devices.

Difficulties were reported in 1956 at the Bolshevik Plant in Kiev. The plant was scheduled to design and produce 16 new and modernized models of tire-making machinery. ~~in 1956~~ Of these, only one was produced on schedule, and eleven were delayed for periods up to 4 months. This poor record was due to the inadequate organization of the design department and to inefficiency in industrial administration and supply. Significant also is a 1955 report from a Kirov tire plant that its machinery was mostly obsolete, but that the new machinery supplied to the plant was less productive than the old. The plant itself built 3 models of machines for assembling large tires apparently because it could not obtain the necessary machinery elsewhere.

2. Czechoslovakia

The Buzuluk Machinery Plant in Komarov is the only producer of tire-

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manufacturing machinery in Czechoslovakia. Among its products is a four-stage automatic vulcanizer press. In 1953, the plant supplied 27 heavy machines for the Soviet rubber industry. Some of the plant's output was displayed at the Damascus Fair in 1956. In June of this year, Indonesia ordered a fully automatic tire plant from this concern. Under the arrangement, Indonesian workers were to be trained by the staff of the Buzuluk Plant. Delieveries of equipment to Indonesia began in 1956 and ended in the fall of 1957. It is interesting to note that the Buzuluk Plant was one of several criticized by the Soviet press in 1957 for turning out defective goods.

This plant has supplied tire-building equipment to the USSR and in June of 1956 it completed negotiations for the sale of a "fully automatic tire plant" to Indonesia.

3. East Germany

The Ernst Thaelman Plant in Magdeburg, reportedly the largest heavy machinery plant in East Germany, produces various types of heavy equipment including tire-manufacturing machinery. Its product mix includes automatic tire heaters and presses (25 per month in 1955), rubber mixers (seven per month) and rubber rolling mills (30 per year). Most of the output is exported to the USSR, some to other European satellites. In addition, there is also the above-referred-to report, referred to in section A above, of an East German offer to supply tire-making machinery to Uruguay.

4. Communist China

In recent years, China has begun the manufacture of tire-making

machinery. A Chinese radio broadcast of October 1955 reported that the Dairen machinery plant manufactured numerous sets of machines for the tire industry -- rubber mixers, smelters, and rubber cutting machines. These machines were being produced for the first time in China and were all reportedly automatically controlled. Several other Chinese plants manufacture a few types of tire machinery. The Chinese announced in April of 1958 that "they must increase the number of types of rubber equipment and molds for automobile, bicycle, and cart tires, never fearing complexity, so that after two years we will basically be able to produce all rubber equipment." It appears to be a good guess that the two-year goal for self-sufficientcy in"rubber equipment" is overly optimistic, and that China will continue to depend on imports for the more complex types of machinery available.

C. Outlook

There is no reason to doubt, that, given the necessary priority, the USSR heavy equipment industry could produce modern, up-to-date tire-making machinery. The obsolescence of models currently produced and the design problems incurred in the design of new models is attributable largely to the presumably low priority accorded this type of machinery in the Soviet economy which concentrates its (research and production efforts) on the expansion of military and supporting industries,

delays, additional investments in

and ~~neglects~~ less immediately important industries as long as their shortcomings do not interfere with priority projects or unduly impede the over-all progress of the economy. The ready availability of Western tire-making equipment of the latest design - such as is now actively being sought by the USSR - will mitigate, if not eliminate, a number of the production difficulties encountered by Soviet tire ~~plant machinery manufacturing and tire plant making~~ manufacturing industries. There is ample precedent for assuming that Russian engineers will carefully copy/ ~~direct~~ the new machinery and assembly lines received from the West and produce them in their own plants in sufficient quantities to meet growing requirements. In this manner, the Soviet tire-making industry can be completely modernized at a minimum ~~of cost and effort in research, labor, and materials~~ of cost in terms of labor and materials, leaving research facilities and ~~engineering~~ engineering skill free to pursue more strategically important projects.